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ABSTRACT

In 1997, the Council on Library and Information Resources (CLIR) supported a project on the geographic spread of the commercial Internet Service Provider (ISP) market. This Research Brief describes some of the principle findings of a report (by Professor Shane Greenstein of the Kellogg Graduate School of Management, Northwestern University) on the project. The ISP market is the leading supplier of Internet access in the United States. A critical issue for policymakers is whether commercial ISPs will naturally provide wide geographic scope of their own accord, in pursuit of profitability. There are two predominant business models of commercial service providers: one that depends on firms structured to provide a national service, and one that depends on local firms providing local services. The commercial ISP industry will provide geographic scope not as an end in itself but as part of a general strategy to target a particular type of customer. ISPs are assigned to five categories in terms of strategy/structure: urban/national; urban/local; rural/local; rural/national; and regional firms. The survival of local and national ISPs has important implications for the geographic scope of the industry; expansion of the Internet by ISPs is driven by pursuit of commercial opportunities. Structural and strategic differences in the ISP industry and within markets should be central issues in policy discussions of universal access to advanced communications and computing technology. Two United States maps show the distribution of ISPs in March 1997, and urban counties with and without ISPs for the same month and year. (AEF)

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COUNCIL ON LIBRARY AND INFORMATION RESOURCES
RESEARCH BRIEF 5
April 1998

Universal Service in the Digital Age: The Commercialization and Geography of US Internet Access

In 1997, within a program funded by The Andrew W. Mellon Foundation to study the economics of information, CLIR supported a project on the geographic spread of the commercial Internet Service Provider (ISP) market. Professor Shane Greenstein of the Kellogg Graduate School of Management, Northwestern University, conducted the study. This ***Research Brief****, drawn from Professor Greenstein's report on the project, describes some of the principal findings.*

Universal service is an enduring issue in communications policy, and the government frequently revisits the principles that inform it. Policy must define the minimal level of acceptable service for all users and determine how government can influence private companies to provide widely dispersed public access. In the past, setting a goal of universal service led to policies that extended the national telephone network into rural and low-income areas. Recently, many analysts have begun to suggest that it will be necessary to redefine the principles of universal service to account for Internet-related services and other combinations of communications and computing. Professor Greenstein's research is a contribution to understanding the background against which such a redefinition might occur.

By historical standards for new technologies, the diffusion of Internet access is remarkable. "It has grown extraordinarily rapidly," Greenstein writes, "putting it in the same category as the most pivotal technical diffusions in the twentieth century, such as electricity, phones, automobiles, televisions and so on." But commercial Internet Service Providers (ISPs) do not operate under any explicit universal-service mandate, though they do partially use the public switch network. Sensible policy for the network requires an understanding of commercial forces in the ISP market.

The ISP market is the leading supplier of Internet access in the US. With total receipts of between three and five billion dollars for ISP firms in 1997, the industry has eclipsed the university-supported, publicly subsidized network that spawned it. Market-based transactions with ISPs will be the dominant form of delivering online access to medium and small users of the Internet. (The Federal Communications Commission currently does not charge access fees to ISPs, though it is considering a number of proposals to do so.)

Greenstein writes: "Most universal-access issues concern the adoption rates of medium and small users, since these are the users on the margin between no access and a few low-cost alternatives. The vast majority of these users and their providers rely on the public switch network. The presence of ISPs within a local call area, therefore, determines a user's access to cheap Internet service. Similarly, the number of local ISPs determines the density of supply of low-cost access to Internet services within a small geographic region. Thus, the geographic spread of ISPs determines the cost of Internet access for most of the US population."A critical issue for policymakers is whether commercial ISPs will naturally provide wide geographic scope of their own accord, in pursuit of profitability.

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Commercial Forces and Internet Access

For the purposes of his study, Greenstein defines as ISPs all firms that supplied commercial Internet access in spring 1997—a time at which the industry's structure had attained a certain measure of stability—whether they began as on-line information providers (e.g., America OnLine, Compuserve), computer companies (e.g., IBM, Microsoft), telecommunications carriers (e.g., MCI, AT&T), or entrepreneurial ventures (e.g., UUNet, Netcom, or thousands of small ISPs).

Greenstein finds that "two predominant business models vie to be the mechanism that diffuses commercially oriented Internet access across the US." One depends on firms structured to provide a national service; the other, on local firms providing local services. (A third, much less common business model involves regional suppliers.) The influence of commercial forces on the availability of Internet access does not encourage Greenstein to believe that ISPs will necessarily provide universal access.

To document the economic forces at work, Greenstein characterizes the location of over 14,000 dial-up access points offered by commercial ISPs in the spring of 1997. He charts the *availability* of cheap Internet access in different geographic areas, not its adoption by users. (No survey shows that more than 15 percent of households have adopted Internet access, or that more than 40 percent of households have adopted PCs.) How do the different strategic goals of national and local ISPs influence the density of access in different areas? Do all regions of the country have similar access to the Internet services provided by commercial firms? Does the privately financed Internet favor access in some regions over others?

The following are among Greenstein's findings:

- The commercial ISP industry in this country comprises thousands of small, geographically dispersed local markets for Internet access. Markets differ widely in their structure, from competitive to unserved.
- Just under three-quarters of the US population, including virtually all major urban areas and some rural areas, had easy access to commercial ISPs in spring 1997. Approximately 15 percent of the US population lived on the margin between easy access and none, in inadequately competitive markets. The balance of the US population had access to ISPs in neighboring areas.
- Disparities in urban/rural coverage derive from the different strategies of national/local providers. Virtually every national vendor provides access in the major urban areas, where access is, predictably, plentiful. This is consistent with the view of many analysts that Internet access is becoming a commodity business. Access in remote rural areas depends largely on the decisions of independent ISPs with no national affiliation.

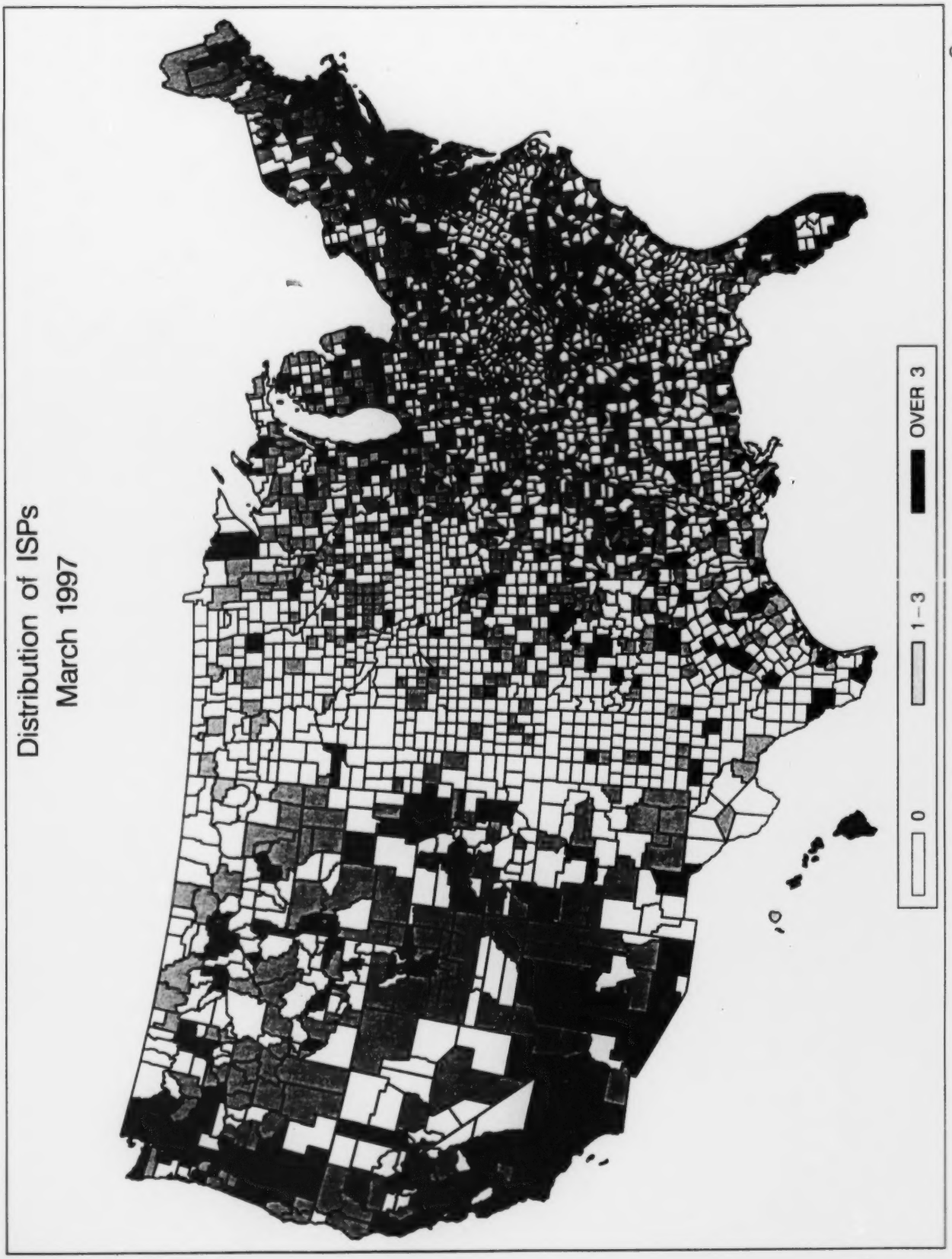
ISPs targeting users with modest needs—the category into which most residential users and small business in the US fall—require them to make phone calls to a local switch. The cost of these phone calls depends on regulations (mostly from the state) that define the local calling area and regulations (both state and federal) that define the price of long-distance calling. All consumers can access the Internet at some price. For Greenstein the important consideration is whether all households have access to Internet service at the same low cost: "The key question of most consumers is whether or not they can 'cheaply' access the Internet. For many users 'cheap' is synonymous with a local telephone call to an ISP."

The Types of ISPs and their Strategies

The commercial ISP industry will provide geographic scope not as an end in itself but as part of a general strategy to target a particular type of customer. Greenstein assigns ISPs to five categories, "as a first-order approximation to understanding strategy and structure":

- Urban/national: national firms that specialize predominantly in urban areas and serve rural areas secondarily (the vast majority of national firms fall into this category).
- Urban/local: local firms that specialize predominantly in urban areas (a substantial majority of local firms fall into this category).
- Rural/local: local firms that specialize in rural areas (though not the majority of local firms, these still number in the hundreds).
- Rural/national: national firms that specialize predominantly in rural areas and only secondarily in urban areas (only a handful of firms are in this category).
- Regional: firms whose base is either rural or urban but whose geographic territory is expanding well beyond the base (only a couple of dozen firms fit the description).

Greenstein believes that most firms will be either high-quality national ISPs or high-quality local ISPs, firms in categories 1 and 2. Categories 3, 4, and 5 are likely to become even less important over time. (Category 5 may become temporarily important and then diminish as many local firms expand beyond their initial geographic reach.)


Distribution of ISPs
March 1997
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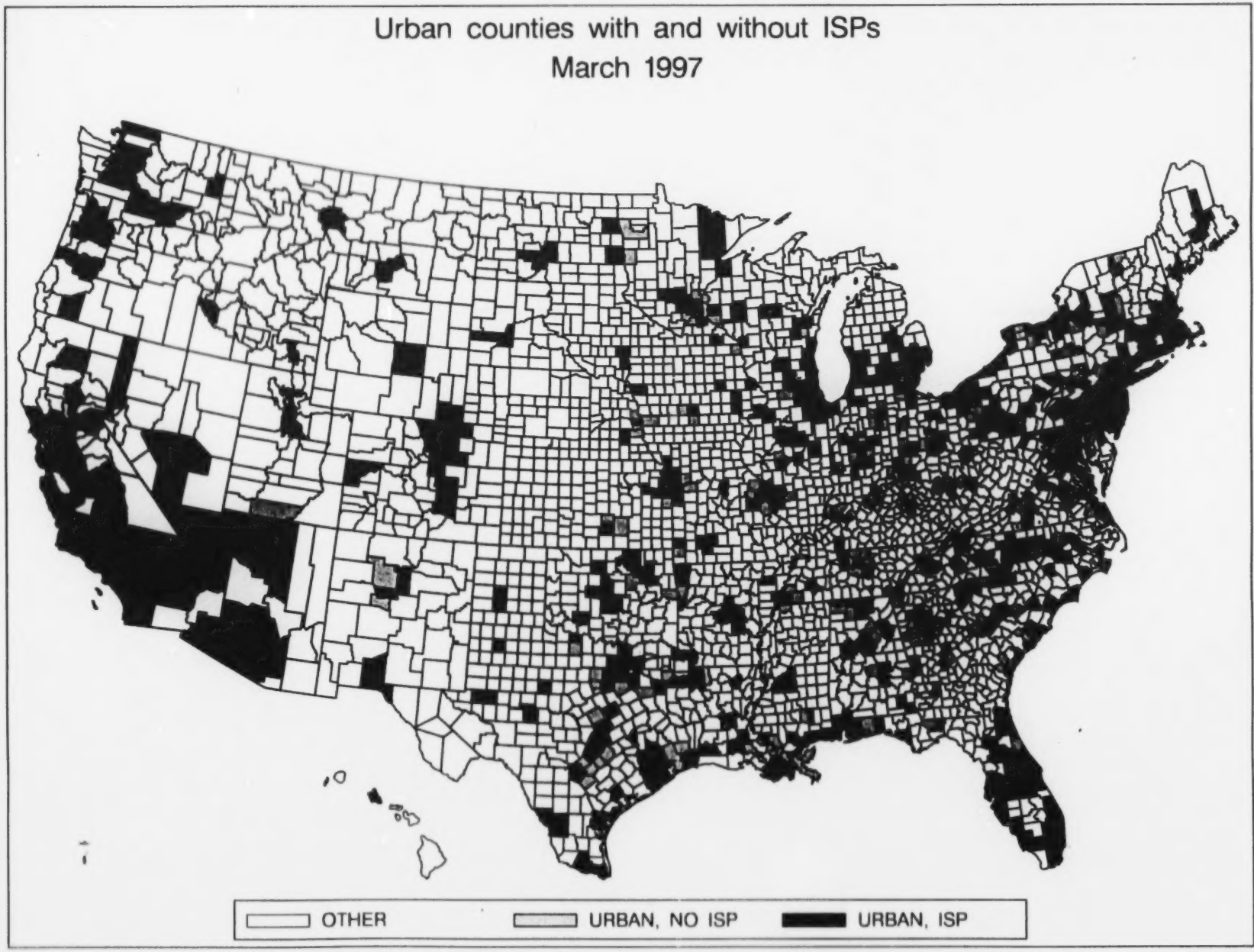
Urban counties with and without ISPs
March 1997
OTHER
URBAN, NO ISP
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The survival of local and national ISPs has important implications for the geographic scope of the industry. Greenstein believes that only a few business models are possible. In urban areas, two appear viable: high-quality national providers, or high-quality local providers with a customized "local component." In the competitive markets of high-density urban areas, either of these business models uses Internet access as a loss leader for other services. In areas of low-density population, the only viable local option is either a low-quality provider or a high-quality provider that offers service for the sake of community interest or other financial interest, while the viable option for a national provider is a network POP (a dial-up node, or "point of presence") with remote monitoring (and, perhaps, lower-quality equipment).

To summarize, expansion of the Internet by ISPs is driven by the pursuit of commercial opportunities. The variety of motives may lead to differences in quality between rural and urban POPs and affect the provision of high-quality ISP service to remote small towns in the US. Greenstein predicts that most urban areas will have abundant Internet access from commercial firms and that some remote areas may not. Between these two predictions lies a very large set of possibilities, to be gauged only by careful empirical observation.

"In the spring of 1997, approximately a quarter of the US population lived in counties with an inadequately competitive supply of commercial Internet access."

The Empirical Evidence

Greenstein's empirical work uses the 3,115 counties into which the US (apart from Alaska, but including the District of Columbia) is divided.

Urban/rural differences in coverage: In the spring of 1997, approximately a quarter of the US population lived in counties with an inadequately competitive supply of commercial Internet access. Approximately half of that subset had no ISP at all in their region, though they may have had easy access in a neighboring county. Thus, the population with inadequate access was approximately 40 million, or about 15 percent of the population. Population levels are a good predictor of the number of suppliers in a county, but density is not. On average, 20,000 additional people induce another ISP to enter. Every single urban county without any ISPs is located next to an urban country with ISP entry, and "it is unlikely that any but a few urban areas contain insufficient Internet access."

The competitiveness of urban/rural areas: Many small markets are entirely supplied by local ISPs. In the 521 counties with only one supplier, 44 percent of the suppliers are local ISPs, 4.2 percent are national ISPs, and just over half are regional ISPs. In 181 counties with two suppliers, 27 percent of the counties have only local ISPs. Only for the 574 counties with four or more suppliers is Internet access offered by a variety of different types of firms.

Structure and strategy of national/local firms: In the spring of 1997, 2,980 ISPs were present in only one county, 246 in two counties, 89 in three, and over 70 in more than 10 counties. "This is a remarkable market structure," observes Greenstein. "Several dozen national firms are present in hundreds of locations, providing access to many users, while the majority of firms are not.... The decisions and strategies of a few dozen national firms influence the experience of the majority of users in the United States. That said, worries about excessive concentration in this industry seem misplaced. No single national firm (or small cabal of them) has much control over the distribution of access in the US at this downstream level.... Since national firms prefer urban areas, they often target the same regions. Virtually all of them are in the same top fifty US cities; the rest of their coverage varies substantially. As a result, three-quarters of the population living in urban areas has access to very competitive service from a variety of national firms."

The Policy Agenda

Greenstein believes that policy discussions of the commercialization of the Internet should be shaped, in part, by the following important considerations:

- There is a minimum threshold of population needed to support entry of an ISP POP, and local and national POPs may face different thresholds.
- Urban and rural areas show different market structures. Marginal rural areas, if they are covered at all, are covered mostly by local or regional ISPs and only somewhat by national ISPs. In urban areas, virtually all markets contain a mix of local and national ISPs.

• Local and national firms appear to pursue different entry strategies, and this translates into differences of geographic scope for local and national firms.

Three views have been proposed to account for the different population thresholds that prompt entry by local and national POPs, and Greenstein conjectures that these views will help set the agenda for the universal-access debate into the next century (he is partial to the first and the third). First, local POPs in rural areas may enter with a lower quality of service than national POPs, by using low-quality equipment, for example, to reduce costs. Alternatively, local POPs in rural areas may be entering with value-added services different from those of national POPs in urban areas—that is, local POPs in rural areas may not be deriving much profit from their ISP service but may make up for these losses with other complementary services that are tailored to rural areas. A third view is that many rural ISPs provide service in conjunction with their activity as rural cooperatives or other quasi-public institutions supporting local growth; thus, the key driver of entry into rural areas may be not the profit motive but community and public service.

Greenstein writes: "If there are strong economies of scale at the POP, it will limit entry of ISPs in rural and remote areas. If ISPs become essential for local growth, quasi-public local institutions will try to subsidize local ISPs to overcome these scale economies. If the local component of an ISP's service becomes an essential element of its offerings, then national firms may never find it commercially profitable to move to remote areas. If high-quality service is expensive to offer, then remotely situated firms may find it difficult to afford. And, of course, all of this could change if scale economies weaken or if the costs between high and low quality narrow enough so that ISP product lines become similar in rural and urban areas."

What's Ahead

There appears to be much room for consolidation within the ISP industry, with its scores of national providers and thousands of local ISPs. The market could experience hundreds of ISP mergers and not come close to violating any potential antitrust statute. Nor would the widespread consolidation of ISP firms excessively concentrate access in too few hands. As of spring 1997, there was still an important local component to the industry, and consolidations that do not concentrate market share at the national level may concentrate access in a local market.

Economies of scale at the POP have limited the spread of ISP service to all parts of the country. Most of the population faces a competitive supply of Internet access, while the remainder—in marginal urban or rural areas—faces less ideal conditions. Structural and strategic differences within the ISP industry and within markets should be central issues in policy discussions of universal access to advanced communications and computing technology.

Professor Greenstein's entire study is available at http://skew2.kellogg.nwu.edu/~greenste/research.html. The Web page will also contain the results of a follow-up survey on Internet access that he undertook in fall 1997.

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